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(56) Documents Cited  
GB 2224671 A GB 0231068 A US 4936507 A  
US 4643357 A

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(54) Rotary atomiser for a food flavouring system

(57) A rotary atomiser for a food flavouring system is described comprising a housing (1) for a high speed air bearing turbine (2), an axial hollow spindle (3) driven by the turbine (2), a manifold (4) secured to the housing (1) and turbine (2) the manifold (4) having connections (5) for fluid to be sprayed through the hollow spindle (3), (6) for the air to drive the turbine, (7) for shaping air and (8) for the air-bearing air. The front of the housing (1) has a rotary nozzle (10) with an axial hole connecting with the spindle (3). The nozzle (10) has a recessed front face tapering from an axial hole (11) to the nozzle peripheral rim (14) and a cover (15) secured to the nozzle (10) and spaced from the axial hole (11).

The rotary atomizer is used to spray coat food snack products e.g. potato crisps, with a food flavouring powder mixed with vegetable oil forming an emulsion.

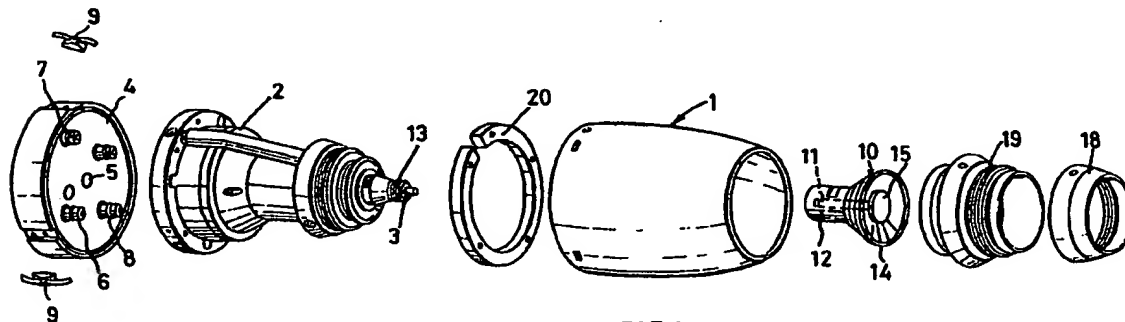
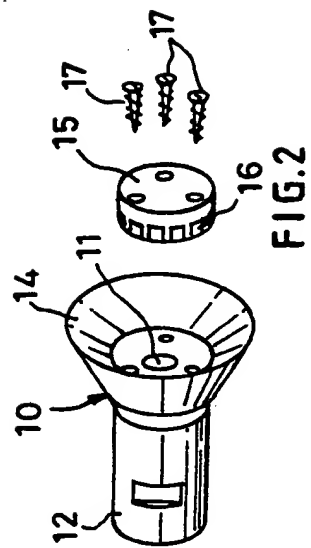
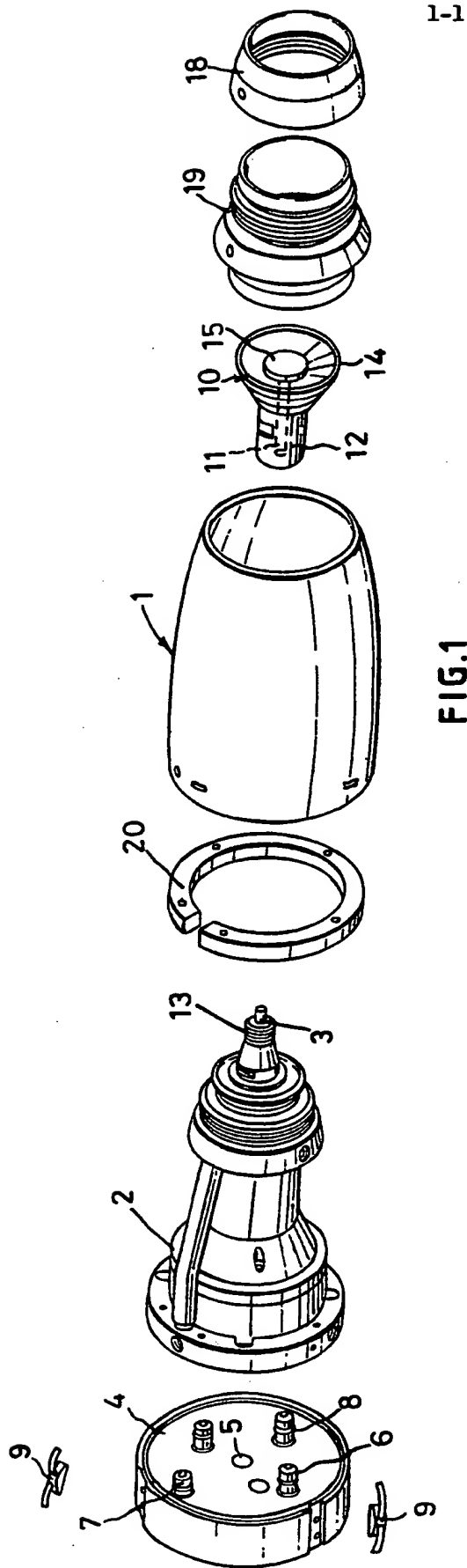


FIG.1

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ROTARY ATOMISER FOR A FOOD FLAVOURING SYSTEM

This invention relates to a rotary atomiser for a food flavouring system.

Rotary atomisers are already known which apply a coating of a fluid material to a surface, such as that used to spray paint to car bodies. These are high speed atomisers for the electrostatic application of conventional and high solids coating materials.

The disadvantage of such rotary atomisers is that the greater the solid content of the coating material, the more likelihood there is of the flow path of the fluid to be sprayed becoming blocked and requiring regular maintenance and cleaning to prevent the atomiser seizing up.

15 An aim of the present invention is to provide an improved rotary atomiser for spraying fluids containing larger particles without clogging the fluid path.

According to the present invention there is provided a rotary atomiser comprising a housing for a high speed air-bearing turbine, an axial hollow spindle driven by the turbine, a manifold secured to the housing and turbine, the manifold having connections for fluid to be sprayed through the hollow spindle, the air to drive the turbine, shaping air and the air-bearing air, the front of the housing having a rotary nozzle with an axial hole connecting with the hollow spindle, wherein the nozzle has a recessed front face tapering from the axial hole to the nozzle peripheral rim and a cover secured to the nozzle and spaced from the axial hole.

30 Preferably, the hollow spindle has a sealing ring which prevents the fluid product which exits from the nozzle entering an air passage surrounding the rear of the nozzle.

An embodiment of an improved rotary atomiser, according to the invention, will now be described by way of example only, with reference to the accompanying

drawings, in which:

Fig. 1 is an exploded view of the rotary atomiser;  
and

Fig. 2 is an enlarged detail of the atomiser  
5 nozzle.

The rotary atomiser comprises an outer housing 1 within which is located a high speed air-bearing turbine 2 which drives a hollow axial spindle 3 for the fluid to be sprayed. The rear of the housing 1 has releasably  
10 secured thereto a manifold 4 for connection to an inlet 5 for the fluid to be sprayed, a connection 6 for the air supply to drive the turbine 2, a connection 7 for a supply of air to shape the fluid supply and a connection 8 for the air to drive the bearing.

15 The manifold 4 has quick release catches 9 to engage the housing and lock it to the manifold.

The forward end of the atomiser has a bell-shaped rotary atomiser nozzle 10 with an axial hole 11 which is driven at a high-speed of up to 60,000 r.p.m.

20 As shown in detail in Fig. 2, the bell-shaped atomiser nozzle 10 has a shank 12 which is securely mounted on the forward end of the driven spindle 3 with the interposition of a sealing sleeve 13 to prevent the fluid to be sprayed from entering the air passage. The  
25 atomiser nozzle 10 has a bell-shaped recess which tapers from the hole 11 to a peripheral rim 14.

The centre hole 11 is covered by a disc 15 which is spaced from the nozzle by a serrated shoulder 16 and is secured to the nozzle recess by screws 17 to form a  
30 radial flow path to the nozzle rim 14 for the fluid to be sprayed. Although a continuous shoulder 16 is illustrated, this may be replaced by a number of spaced serrated shoulders to provide a free outlet path for the sprayed fluid.

35 The nozzle end of the rotary atomiser has a shaping air ring 18 screwed to a shaping air cap 19 which is in

turn secured to the housing 1. A felt muffler 20 is located around the air-bearing turbine 2 to seal the turbine and prevent vibration within the housing 1.

The rotary atomiser has a particular use in the 5 spray coating of food snack products, such as potato crisps, with a food flavouring powder mixed with a vegetable oil to form an emulsion.

The internal fluid feed system of the improved rotary atomiser has been developed to prevent any 10 separation of the flavouring powder from the vegetable oil which would cause blocking of a normal fluid coating system. This improved atomiser allows for continuous production to proceed without the need for flushing the atomiser system to remove dry material caused by particle 15 separation from the oil base.

The liquid droplet size of the spray can be controlled using a computer-controlled panel to enable the operator to set the turbine speed, the shaping air, the fluid flow of the coating to be sprayed and other 20 normal control functions. The size of the liquid droplets can thus be varied from large individual droplets to a very fine continuous mist. The fluid flow rates can be varied to suit production requirements or allow for a wet-coating of the food products or a nearly 25 dry application.

The high speed rotary atomiser is driven by dry, clean oil free air at any selected speed from 0 to 60,000 r.p.m. To coat food snack products with a flavour coating, the atomiser is mounted in a rotatable drum into 30 which the food products to be coated are automatically fed. As the products are rotated past the high speed atomiser they are coated by the liquid spray of flavour powder/oil emulsion, which emerges as a round pattern and touches the inside diameter of the rotating drum. All 35 the individual snack products have to pass through the food flavouring spray.

The design of the bell-shaped nozzle allows for the free flow of the liquid flavouring at a very fine disposition and particle size without blocking of the fluid feed system.

5        A double roller pumping system (not shown) is used to pump the flavoured liquid from a container to the rotary atomiser. The liquid is fed to the manifold at the rear of the atomiser via a plastics hose and is propelled to the atomiser nozzle which rotates at high  
10 speed and sprays the flavoured liquid under centrifugal force from the peripheral rim where it enters the space within the rotary drum at a predetermined angle determined by the angle of the nozzle rim. The amount of liquid flow from the atomiser can be selected on the  
15 control panel, to suit the flavour coating required, by increasing or decreasing the pump rotation speed.

The shape of the pattern of the liquid spray leaving the nozzle can also be adjusted by setting the turbine speed, which can also be used to increase or  
20 decrease the flavouring particle size as required for the particular snack product being coated.

One of the advantages of the improved rotary atomiser is that the fluid feed system is made from stainless steel while the spray nozzle is made from hard  
25 anodised aluminium or stainless steel. The fluid feed and air hoses are made from a suitable polyvinyl material which can be easily removed for cleaning.

## CLAIMS:

1. A rotary atomiser comprising a housing for a high speed air-bearing turbine, an axial hollow spindle driven by the turbine, a manifold secured to the housing and  
5 turbine, the manifold having connections for fluid to be sprayed through the hollow spindle, the air to drive the turbine, shaping air and the air-bearing air, the front of the housing having a rotary nozzle with an axial hole connecting with the hollow spindle, wherein the nozzle  
10 has a recessed front face tapering from the axial hole to the nozzle peripheral rim and a cover secured to the nozzle and spaced from the axial hole.
2. A rotary atomiser as claimed in Claim 1, wherein the hollow spindle has a sealing ring which prevents the  
15 fluid product which exits from the nozzle entering an air passage surrounding the rear of the nozzle.
3. A rotary atomiser as claimed in Claim 1 or 2, wherein the cover is disc-shaped and spaced from the nozzle recess by at least one serrated shoulder to allow  
20 the passage of fluid product from the hollow shaft to the atmosphere.
4. A rotary atomiser as claimed in any preceding claim, wherein the manifold is releasably secured to the turbine and housing by catches.
- 25 5. A rotary atomiser as claimed in any preceding claim, wherein the turbine is sealed in the housing by a felt muffler.
6. A rotary atomiser as claimed in any preceding claim, wherein a shaping air ring is secured to the front  
30 of the housing by a shaping air cap.
7. A rotary atomiser as claimed in any preceding claim, wherein the nozzle cover is disc-shaped and is secured to the nozzle by two or more screws.
8. A rotary atomiser as claimed in any preceding  
35 claim, wherein it has means to mount it in a rotatable food product drum.

9. A rotary atomiser substantially as herein described and shown in the accompanying drawings.

10. Each and every novel feature or novel combination of features herein disclosed.



**Patents Act 1977**  
**Examiner's report to the Comptroller under**  
**Section 17 (The Search Report)**

7 | Application number

GB 9310817.3

**Relevant Technical fields**

(i) UK CI (Edition L ) B2F

(ii) Int CI (Edition 5 ) B05B

**Databases (see over)**

(i) UK Patent Office

(ii) ONLINE DATABASES: WPI AND CLAIMS

Search Examiner

J H WARREN

Date of Search

26. 8 93

Documents considered relevant following a search in respect of claims 1-9

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
Y	GB 2224671 A (GRACO) line 59 column 2 - line 16 column 4	1, 7
Y	GB 0231068 A (HURD) whole document	1
Y	US 4936507 A (DEVILBISS) Figure 3 column line 11	1, 4, 6
Y	US 4643357 A (BINKS) column 3 lines 12-77 cup 24, cover 26, screws 30 shaft 54	1, 7

Category	Identity of document and relevant passages 8.	Relevant to claim(s)

#### Categories of documents

**X:** Document indicating lack of novelty or of inventive step.

**Y:** Document indicating lack of inventive step if combined with one or more other documents of the same category.

**A:** Document indicating technological background and/or state of the art.

**P:** Document published on or after the declared priority date but before the filing date of the present application.

**E:** Patent document published on or after, but with priority date earlier than, the filing date of the present application.

**&:** Member of the same patent family, corresponding document.

**Databases:** The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).